

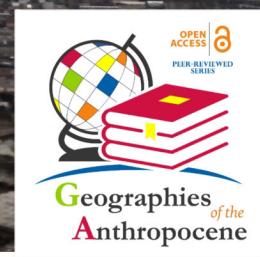
# THE ANTHROPOCENE AND ISLANDS:

## VULNERABILITY, ADAPTATION AND RESILIENCE TO NATURAL HAZARDS AND CLIMATE CHANGE

*Miquel Grimalt Gelabert - Anton Micallef - Joan Rossello Geli*  
*Editors*

*Preface by*  
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IL Sileno  
Edizioni



# **THE ANTHROPOCENE AND ISLANDS: VULNERABILITY, ADAPTATION AND RESILIENCE TO NATURAL HAZARDS AND CLIMATE CHANGE**

Miquel Grimalt Gelabert

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Miquel Grimalt Gelabert, Anton Micallef, Joan Rossello Geli (Eds.)

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Cover: imaginary representation of a tsunami that impacted an island. Source: pixabay.com

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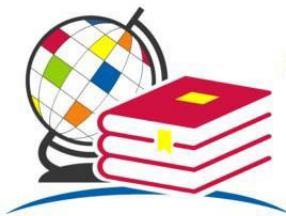


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Geoethics focuses on how scientists (natural and social), arts and humanities scholars working in tandem can become more aware of their ethical responsibilities to guide society on matters related to public safety in the face of natural hazards, sustainable use of resources, climate change and protection of the environment. Furthermore, the integrated and multiple perspectives of the Environmental Humanities, can help to more fully understand the cultures of, and the cultures which frame the Anthropocene. Indeed, the focus of Geoethics and Environmental Humanities research, that is, the analysis of the way humans think and act for the purpose of advising and suggesting appropriate behaviors where human activities interact with the geosphere, is dialectically linked to the complex concept of Anthropocene.

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## Introduction

Miquel Grimalt-Gelabert<sup>1</sup>, Anton Micallef<sup>2</sup>, Joan Rosselló-Geli<sup>3</sup>

Islands are, by definition, spaces with a clear spatial limitation, which determine some geographical characteristics that make them really sensible to impacts and changes. In those spaces there are conditions for a microcosm of physical and human trends, combining by the resources limitation originated by the reduced physical surface and the coastal presence. All together make island especially fragile facing problems linked to oceanic areas, usually located in geological active areas and, therefore, subject to internal risk factors, result of seismicity and volcanism.

Societies living on such territories follow particular development patterns, usually related to high human pressure on land and with economies and structures based on activities highly sensitive to

Natural hazards have a special effect on islands, both at natural and human level. Factors such as droughts, intense rainfall, landslides, volcanic eruptions and hurricanes or typhoons can originate catastrophes while, at the same time, human actions can also generate negative impacts over such limited and sensitive areas, often of difficult solution.

In terms of disruptions on the physical surroundings, is clear the importance of climate change on the island's future, worldwide. Temperatures increases, the raise of sea level and changes on rainfall distribution-and consequently on the availability of water resources-will have large effects, worsening pre-existing situations or causing their emergence in previously non affected territories.

Hence the need for an overall overview about the problems affecting insular regions, from the smallest to the largest ones, problems ranging from risks historically located in an area to the emergence of new ones, all together related to phenomena like the increase of population, the urban growth and the current climate crisis.

Due to all the above, this volume of the series “Geographies of the Anthropocene”, titled “*The Anthropocene and islands: vulnerability,*

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*adaptation and resilience to natural hazards and climate change*" sought to bring together contributions about different aspects, affecting islands, with the objective to show how visions coming from different research areas can provide an overall vision about risks and climate change, an overview useful for geographically different regions, both for its size and for its socio-economical characteristics.

The chapters provide contributions from a large variety of geographical areas, ranging from the Pacific American coast to the Atlantic Africa shores and, finally, ending in the Mediterranean Sea. Within the Mediterranean, there are examples of subjects on African and European coasts and also from the western and eastern basins. At the same time, there is a variety of insular dynamics, depending on the scale of the analyzed regions, from the largest islands like Sicily or Sardinia to the smallest like Ischia, Stromboli or the Sahel islets.

Regarding topics, we can find chapters related to natural risk, with a special emphasis on the risk derived from tectonical and volcanical activity in the central Mediterranean Sea, while other subjects are related to climate change and its impact at different levels, from a societal view regarding the indigenous communities displacement to the variability of water resources and the loss of historical and cultural heritage with the possible disappearance of islets in the North African coast.

At all times, the contributions do not set aside the importance of the anthropogenic side of the described processes. Societies are not passive actors in front of a dangerous or a changing environment but they may, by themselves, create, accelerate, aggravate or mitigate the environmental impacts. Fully into the Anthropocene, the active account of the human factor is included in all of the chapters of this volume.

The lack of resources often leads to a dependency of external help that not always is adequately fulfilled for the islanders. Simultaneously, the inability to solve problems like the sea level increase implies the need to relocate communities that will lose their traditional lands and should find new areas to live. This view of islands as particularly vulnerable zones appears in Adèle de Mesnard chapter, regarding the sparsely populated Alaska islands, and also in Ameur Oueslati one, related to the Sahel islets, a Mediterranean land with a historical human presence and endangered heritage assets in front of a rising sea and an uncontrolled urban pressure.

Economical activities and the growing demand on water resources is the subject of the chapter from Christian Depraeterel Konstantinos X. Soulis, Demetrios E. Tsesmelis, Georgios Avgoustidos and Ioannis Spilaris, in

which the effects of the change of the rainfall regime are related to the water availability on Mediterranean touristic islands.

The population increase factor is the main subject for Salvatore Cannizzaro, Antonio Danese and Riccardo Privitera contribution, regarding the population centers around the Etna, the largest volcano of Europe, located in the largest island of the Mediterranean. The volcanic risk and its seismic derivations are studied by Messina in his chapter about Stromboli. Without volcanoes but affected by telluric movements, the island of Ischia is studied by Giovanni Gugg, analyzing an often earthquake affected land.

The societal answer in front of the risk is explained by the territorial planning and preventive actions from public administrations, both subjects developed by Andrea Corsale, Carlo Perelli and Giovanni Sistu in their chapter about Sardinia.

Finally, it is important to know how is the societal perception of risk, the resources limitation and the global change, issues analyzed by Cheikh Faye and Antoine Demba Manga regarding the island of Carabane, in the Senegal coast.

A variety of approaches about problems with a common topic, the insular perspective and a holistic vision is what is offered in this volume, nowadays available to readers.

## **Introducción**

*Miquel Grimalt-Gelabert<sup>1</sup>, Anton Micallef<sup>2</sup>, Joan Rosselló-Geli<sup>3</sup>*

Las islas son, por definición, unos espacios con unos límites espaciales concretos que determinan unas características geográficas que las hacen particularmente sensibles a impactos y cambios. En los territorios insulares se dan condiciones de un microcosmos físico y humano especiales combinándose la inherente limitación de recursos marcada por el espacio reducido y por la presencia del factor litoral que las hace especialmente frágiles frente a las problemáticas ligadas a los medios oceánicos y muchas veces ubicadas en áreas geológicamente activas y por lo tanto sometidas a los factores de riesgo interno derivados de la sismicidad y el vulcanismo.

Las sociedades que habitan este tipo de territorios también siguen pautas de desarrollo particulares, a menudo con una elevada ocupación humana y dando lugar a economías y a estructuras basadas en el desarrollo de actividades económicas muy sensibles a las inclemencias del medio.

Los riesgos naturales tienen una especial incidencia en los espacios insulares, tanto a nivel natural como a nivel humano. Factores como las sequías o las lluvias intensas, los deslizamientos de tierras, las erupciones volcánicas y huracanes o tifones pueden originar catástrofes y al mismo tiempo las actuaciones humanas pueden generar sobre estos medios físicos sensibles y limitados impactos negativos de difícil solución.

En cuanto a las alteraciones en el medio físico, se hace especialmente evidente la importancia del cambio climático en el devenir futuro de las islas en todo el mundo. Los incrementos de la temperatura, el aumento del nivel del mar y las modificaciones en la distribución de las precipitaciones – y en consecuencia sobre la disponibilidad de recursos hídricos- tendrán un especial efecto agravando situaciones ya existentes o provocando su aparición en territorios no afectados hasta el momento.

Por todo ello hace falta una visión general que muestre el conjunto de problemas que afectan a los espacios insulares, desde los más pequeños hasta aquellos de mayor extensión; problemas que van desde la existencia

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de riesgos históricamente localizados en un territorio hasta la aparición de nuevos, todo ello ligado a fenómenos como el incremento del número de habitantes, la expansión de la urbanización o la crisis climática actual.

Es por ello que este número de la revista “Geographies of the Anthropocene”, titulado “The Anthropocene and islands: vulnerability, adaptation and resilience to natural hazards and climate change” quiere reunir un conjunto de aportaciones sobre diferentes aspectos que afectan a las islas con el objetivo de mostrar como visiones que surgen desde diferentes disciplinas pueden aportar una visión global sobre los riesgos y el cambio climático, visión que puede ser útil para espacios geográficamente diferenciados, tanto por tamaño como por características socio-económicas.

El volumen reúne aportaciones de ámbitos distribuidos sobre una amplia variedad de espacios geográficos, que abarcan desde el litoral americano del Pacífico, pasando por el litoral atlántico africano para finalizar en el mundo mediterráneo, dentro de este último espacio diversifica con ejemplos de ambos litorales (norafricano y europeo) y de las dos grandes sub-cuencas, occidental y oriental. Igualmente se tratan dinámicas insulares diversas por la escala de los territorios analizados que varían desde las grandes islas de Sicilia y Cerdeña hasta realizar estudios sobre conjuntos insulares de tamaños notablemente reducidos como las islas del Sahel, Ischia o Strómboli.

Desde el punto de temático, encontramos por un lado capítulos dedicados a los riesgos naturales, haciendo especial hincapié en los derivados de la intensa actividad tectónica y volcánica del eje central de la cuenca mediterránea, mientras que otro conjunto de los estudios hace referencia al cambio climático y su impacto a diferentes niveles, desde el social con el desplazamiento de indígenas hasta la variabilidad del recurso agua pasando por la pérdida de patrimonio histórico-cultural con la posible desaparición de islotes en la costa del norte de África.

En todo momento las aportaciones reunidas en este volumen no dejan de lado la importante componente antrópica de los procesos descritos. Las sociedades no únicamente son factores pasivos ante un medio peligroso o cambiante, sino que también constituyen elementos que por sí mismos generan, aceleran, agravan o mitigan el impacto del medio físico. De lleno en el antropoceno, esta consideración activa del factor humano es presente en todas y cada una de los capítulos de esta monografía.

La falta de recursos provoca una dependencia del exterior que no siempre puede ser satisfecha de forma satisfactoria para los habitantes de las islas. A la vez, la imposibilidad de dar una solución a problemas como el incremento del nivel del mar, implica la necesidad de relocatear comunidades enteras,

que perderán su espacio habitual y deberán encontrar un nuevo lugar donde vivir. Esta visión de las islas como espacios especialmente frágiles ante las nuevas condiciones planea sobre los artículos de Adèle de Mesnard referido al entorno escasamente antropizado de las islas de Alaska y de Oueslati referido a los islotes del Sahel en un territorio mediterráneo con una antiquísima ocupación humana y valores patrimoniales en peligro de desaparición ante un mar ascendente y una presión urbanizadora incontrolable.

La presión de las actividades económicas y la creciente demanda de recursos hídricos es el tema de la aportación de Christian Depraetere, Konstantinos X. Soulis, Demetrios E. Tsesmelis, Georgios Avgoustidis y Ioannis Spilaris, que repasa las consecuencias del evidente cambio del régimen pluviométrico sobre la disponibilidad de agua en los espacios insulares turísticos mediterráneos.

El factor del incremento de la población es el motivo central de la aportación de Salvatore Cannizzaro, Antonio Danese y Riccardo Privitera, en torno a los núcleos de población que rodean el Etna mayor estratovolcán activo del continente europeo, situado en la mayor isla del Mediterráneo. El mismo riesgo volcánico y sus derivaciones sísmicas son el objeto de análisis por Messina aplicados a Strómboli. Desprovisto de volcanes, pero afecto a los movimientos telúricos, el territorio de Ischia es tratado por Giovanni Gugg en referencia a un espacio repetidamente afectado por los terremotos.

La respuesta de las sociedades ante los riesgos se expresa a través de la planificación del territorio y las actuaciones preventivas de la administración, extremos que son tratados por Andrea Corsale, Carlo Perelli y Giovanni Sistu en referencia a Cerdeña.

Finalmente es imprescindible conocer como es la percepción social del riesgo, la limitación de recursos y del cambio global, en este caso analizados por Cheikh Faye y Antoine Demba Manga en referencia al territorio de l'île Carabane en la costa senegalesa.

Diversidad de enfoques sobre problemas variados con el fondo común de la perspectiva insular y una visión integrada es lo que se ofrece en este volumen que se pone en manos del lector.

## **Introduzione**

*Miquel Grimalt-Gelabert<sup>1</sup>, Anton Micallef<sup>2</sup>, Joan Rosselló-Geli<sup>3</sup>*

Le isole sono, per definizione, spazi con precisi limiti spaziali che determinano alcune caratteristiche geografiche che le rendono particolarmente sensibili agli impatti e ai cambiamenti. Nei territori insulari esistono particolari condizioni relative a fattori fisici e antropici, coniugando l'intrinseca limitazione delle risorse segnata dallo spazio ridotto e dalla presenza del fattore costiero che le rende particolarmente fragili a fronte di problematiche legate ad aree oceaniche e molte volte localizzate in aree geologicamente attive e, quindi, soggette a fattori di rischio derivati da sismicità e vulcanismo.

Le società che abitano in questi territori seguono anche particolari modelli di sviluppo, spesso ad alta occupazione umana e che danno origine a economie e strutture basate sullo sviluppo di attività economiche molto sensibili alle intemperie dell'ambiente.

I pericoli naturali hanno un impatto speciale sulle aree insulari. Fattori come siccità o forti piogge, frane, eruzioni vulcaniche e uragani o tifoni possono causare disastri, ma, allo stesso tempo, le azioni umane possono anche generare impatti negativi su aree così limitate e sensibili, spesso di difficile soluzione.

Per quanto riguarda le alterazioni dell'ambiente fisico, l'importanza del cambiamento climatico nel futuro sviluppo delle isole nel mondo è particolarmente evidente. L'aumento della temperatura, l'innalzamento del livello del mare e le variazioni nella distribuzione delle precipitazioni - e di conseguenza sulla disponibilità di risorse idriche - avranno un impatto significativo, aggravando le situazioni esistenti o provocandone la comparsa in territori non interessati fino a quel momento.

Per tutti questi motivi è necessaria una visione generale che mostri l'insieme dei problemi che interessano le aree insulari, dalle più piccole alle più grandi; problematiche che vanno dall'esistenza di rischi storicamente localizzati in questi territori alla comparsa di nuovi, tutti legati a fenomeni

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come l'aumento del numero di abitanti e dell'urbanizzazione o l'attuale crisi climatica.

Partendo da questi presupposti è nata l'idea di questo volume all'interno della collana scientifica “Geographies of the Anthropocene”, dal titolo “The Anthropocene and islands: vulnerability, adaptation and resilience to natural hazards and climate change”, con l'intento di raccogliere una serie di contributi sui diversi aspetti che interessano le isole e con l'obiettivo di mostrare come visioni che derivano da diverse discipline possano fornire una visione globale sui rischi e sui cambiamenti climatici, una visione che possa essere utile per regioni geograficamente differenziate, sia per le loro dimensioni che per le loro caratteristiche socio-economiche.

Il volume raccoglie contributi da un'ampia varietà di aree geografiche, dalle coste del Pacifico americano, attraverso il litorale atlantico africano, all'area del Mediterraneo: all'interno di quest'ultima area i contributi si distinguono con esempi e casi studio su entrambi i litorali (nordafricano ed europeo) e sui due grandi sottobacini, occidentale e orientale. Allo stesso modo, vengono affrontate dinamiche insulari diverse a causa delle dimensioni dei territori analizzati, che variano dalle grandi isole della Sicilia e della Sardegna a studi su gruppi di isole notevolmente piccoli come le isole del Sahel, Ischia o Stromboli.

Dal punto di vista tematico troviamo, da un lato, capitoli dedicati ai rischi naturali, con particolare enfasi su quelli derivati dall'intensa attività tettonica e vulcanica dell'asse centrale del bacino del Mediterraneo, mentre un altro set di studi fa riferimento al cambiamento climatico e al suo impatto a diversi livelli, da quello sociale, con lo spostamento di popolazioni indigene, alla variabilità della risorsa idrica attraverso la perdita del patrimonio storico-culturale con la possibile scomparsa di isolotti della costa nordafricana.

In ogni momento, i contributi raccolti in questo volume non trascurano l'importante componente antropica dei processi descritti. Le società non sono solo fattori passivi di fronte a un ambiente pericoloso o mutevole, ma costituiscono anche elementi che, di per sé, generano, accelerano, aggravano o mitigano gli impatti sull'ambiente. Proprio nell'Antropocene, questa considerazione attiva dei fattori umani è presente in ogni capitolo di questo volume collettaneo.

La mancanza di risorse determina una dipendenza dall'esterno che non sempre può essere soddisfatta in modo soddisfacente per gli abitanti delle isole. Allo stesso tempo, l'impossibilità di fornire una soluzione a problemi come l'innalzamento del livello del mare implica la necessità di ricollocare intere comunità, che perderanno il loro spazio abituale e dovranno individuare un nuovo luogo in cui vivere. Questa visione delle isole come spazi

particolarmente fragili di fronte alle nuove condizioni si ritrova nel capitolo di Adèle de Mesnard, riferendosi all’ambiente appena antropizzato delle isole dell’Alaska e nel contributo di Oueslati, facendo riferimento agli isolotti del Sahel in un territorio mediterraneo con antica occupazione umana. I valori del patrimonio rischiano di scomparire di fronte ad un innalzamento del livello del mare e ad una pressione urbana incontrollabile.

La pressione delle attività economiche e la crescente domanda di risorse idriche è oggetto del contributo di Christian Depraetere, Konstantinos X. Soulis, Demetrios E. Tsesmelis, Georgios Avgoustidis e Ioannis Spilaris, che analizza le conseguenze dell’evidente cambiamento del regime delle piogge sulla disponibilità di acqua nelle aree turistiche insulari del Mediterraneo.

Il fattore di incremento demografico è il tema centrale del contributo di Salvatore Cannizzaro, Antonio Danese e Riccardo Privitera, attorno ai centri abitati che circondano l’Etna, il più grande stratovulcano attivo del continente europeo, situato sulla più grande isola del Mediterraneo. Lo stesso rischio vulcanico e le sue derivazioni sismiche sono oggetto di analisi da parte di Messina, applicate all’isola di Stromboli. Privato di vulcani, ma colpito dai terremoti, il territorio di Ischia è trattato da Giovanni Gugg in riferimento ad un’area più volte colpita dai terremoti.

La risposta della società ai rischi si esprime attraverso la pianificazione del territorio e le azioni preventive dei *local policy-makers*; si tratta di temi che vengono affrontati da Andrea Corsale, Carlo Perelli e Giovanni Sistu con riferimento alla Sardegna.

Infine, è fondamentale conoscere la percezione sociale del rischio, la limitazione delle risorse e il cambiamento globale, secondo il caso studio analizzato da Cheikh Faye e Antoine Demba Manga, in riferimento al territorio de l’île Carabane, sulla costa senegalese.

Questo volume, dunque, offre una diversità di approcci su vari problemi, con lo sfondo comune della prospettiva insulare, in una visione integrata.

*"The Anthropocene and islands: vulnerability, adaptation and resilience to natural hazards and climate change" include 8 original research chapters, of authors from around the world, explaining how islands are affected by natural hazards and global change. The volume contributions range from small islands in Alaska to large ones such as Sicily in the Mediterranean and focus on facts such as water resources, sustainability and societal impacts of risk and climate change. The author's reflections share a wide scientific approach that will enrich a subject, islands and its future, which will become more and more important in the next decades.*

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